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nicata were found in the egg-packets on April 6th and on April 17th, though specimens with young are not frequent. The eggs of a small gasteropod abounded on the stems of *Parypha* during the entire month. Five species of nudibranchs, belonging to the genus *Eolis*, have laid their eggs in the aquaria. The hermaphrodite gland of *Eolis papillosa* contains giant erythrophilous spermatozoa, like those of *Paludina vivipara*, which Auerbach has described. Eggs of *Ilyanassa* were found April 25th and 27th. The 'sand collars' of *Natica* were found at Hadley Harbor, April 25th.

Echinoderms.—*Echinorachnius parma* has not been examined since the early part of the month, when it was breeding abundantly. On April 16th the plutei, developed from eggs fertilized on March 22d, were still living in the aquaria. Eggs of this species have also been obtained in June and July. It is a remarkable fact that, though neither *Asterias vulgaris* nor *Asterias forbesii* at Woods Holl contain ripe sexual products, those of the latter species in certain parts of Narragansett Bay have been full, almost to bursting, of eggs and spermatozoa since the early part of April. The holothurians *Thyone*, *Leptosynapta giradii* and *L. roseola*, were examined April 24th, and were all full of nearly ripe eggs or sperm. Not the least attractive of the echinoderm eggs are those of the little starfish, *Cribrella sanguinolenta*. This species is not uncommon at Woods Holl, and the eggs, which were frequently laid in the aquaria during the third week in April, are as large as those of *Clepsine* or *Sycotypus*. They develop slowly, reaching the two-cell stage in about 6 hours. This material would undoubtedly be of great value in solving problems of cleavage and of echinoderm metamorphosis.

Cœlenterates.—The profusion of cœlenterate material was a feature of every collecting excursion during the first half of the month. Hydromedusæ of many different

species were abundant in the tow until about the 17th of the month, and since then have been caught in small numbers. Among these, *Hybocodon* was perhaps the most numerous, although *Coryne* and *Tiaropsis* has been taken frequently. *Tima formosa*, abundant in 1897 at Newport, has not been seen. Hydroids of the brilliantly colored *Coryne* occurred in colonies that could be measured by the square yard, and those of a species of *Campanularia* could be measured by the square rod. On April 26th the *Coryne* had disintegrated. The large jellyfish, *Cyanea arctica*, has been represented throughout the month by specimens ranging from one-half inch to seven and eight inches in diameter, and *Ephyrae* were caught as late as the 21st. On April 8th the water at Waquoit was full of *Aurelia*, most of the specimens being from one to two inches in diameter, though some were much larger. *Metridium marginatum* was examined on the 18th, and was found to be full of eggs, apparently nearly mature. One of the 'sulphur sponges' was observed to extrude clouds of spermatozoa on April 10th.

The gelatinous alga, so abundant during March and the first half of April, gradually diminished in quantity after the 17th, and on April 25 little or none was found in the nets.*

A. D. MEAD.

CURRENT NOTES ON PHYSIOGRAPHY.

THE ORIGIN OF PUGET SOUND.

THE long fiords of the submerged mountainous coast of Alaska and British Columbia naturally give rise to the impression that Puget Sound and its many branches in Washington are also drowned valleys. This off-hand interpretation is combated in an essay on the 'Drift phenomena of Puget

* The Breeding of Animals at Woods Holl for the month of March was published in 'SCIENCE,' April 8, 1898.

Sound,' by Willis (Bull. Geol. Soc. Amer., IX., 1898, 111-162), who after a study of the region concludes that it was invaded by confluent glaciers from mountains on the north, east and west, and that the spaces between the ice streams were built up by washed drift. Plateau-like land-arms were thus constructed with relatively even upland surfaces and smooth marginal slopes, while the glaciers held possession of the troughs. When the glaciers melted away, the troughs came to be occupied by arms of the sea. Lateral moraines along certain of the troughs prove that they antedate the latest epoch of glaciation, and are not channels of post-Pliocene erosion. The greater depths of certain troughs some distance in from their outer end does not accord with the idea that they are drowned valleys of stream erosion. Since the disappearance of the ice, alluvial deposits brought down by the larger rivers have formed delta flood plains in a number of the troughs, such as those of Duwamish and Puyallup valleys, by Seattle and Tacoma.

THE PLAINS OF RUSSIA.

DAS RUSSISCHE FLACHLAND forms the subject of an interesting sketch by Philippson (Zeitschr. Gesell. f. Erdk. Berlin, XXXIII., 1898, 37-68), from which the leading features of that great region may be easily gathered. Paleozoic strata, nearly horizontal and but moderately indurated, rest upon a crystalline floor that appears on the northwest and southwest; Mesozoic and Tertiary strata overlap irregularly, chiefly from the southeast. Bevelling far and wide across these varied formations stretches the upland plain of comparatively even surface at an altitude of 200-300 meters. The northwestern part of the plain is heavily covered with glacial drift, through which the bed rock is seldom seen; the southern part has a loess mantle, which overlaps the border of the drift. The for-

mer is the region of forests; the latter, of steppes; the 'black earth' being a modification of loess by the superficial addition of humus. The plain beneath these discrete covers is described as a gigantic 'denudationsflache,' the result of the lateral shifting of great rivers when the land stood lower than now; and the question is raised whether the floods from melting ice fields may not have supplied the great rivers. To-day the plain is dissected by narrow valleys of branching streams, and from this an uplift is inferred subsequent to the peneplanation.

The insular position of Great Britain has been recognized by British geologists and geographers as giving rise to an over-estimate of the relative value of marine as compared to sub-aerial denudation. May not the relatively modern block-dislocations of the uplands and mountains of Germany, where many areas of resistant rocks are included, and where an advanced stage of base-levelling has not been reached in the present cycle of erosion, have given rise to an under-estimate of the competency of normal rivers to produce peneplains. Such general denudation is aided truly enough by the lateral shifting of the larger streams, but it is accomplished chiefly by the slow weathering of the inter-stream hills. Does it not hurry the slow processes of penultimate denudation to imply that they may have been accomplished in so brief an episode as a glacial period, and by so temporary an agent as the floods from a melting ice sheet?

TIDAL PROBLEMS.

THE difficulty of accounting for the actual tides of the oceans, in contrast to the ease of explaining the lunar and solar forces to which they are due, is well set forth in an inaugural address 'Ueber Gezeitenwellen,' by Krümmel, on his accession to the rectorate of the University of Kiel (Ann. der Hydrog., XXV., 1897, 337-346). Among

the special features mentioned are the following: The tide wave advances progressively from south to north on the west coast of Europe, but arrives simultaneously along a great stretch of eastern North America. It advances northward on the east coast and southward on the west coast of New Zealand, but arrives all at once on the eastern coast of Australia over a belt covering 26 degrees of latitude. Spring tide is delayed from half a day to two and a-half days after new moon at most Atlantic stations, but at Toulon, on the Mediterranean, it occurs $4\frac{1}{2}$ hours before the syzygies. The diurnal inequality, which should reach its maximum with the greatest declination of the moon, is belated on the European coast by from four to seven days, while at one point in the Gulf of Mexico it is accelerated by 17 hours. Much consideration is given to Boergen's discussion of interfering waves, whereby the notable differences between the tides of oceanic islands may perhaps be accounted for. The once-a-day tides on lunar time in the Gulf of Mexico and on solar time at Tahiti and elsewhere are thus to be explained. The studies of George Darwin and Lord Kelvin in the modifications suffered by the tide waves when running ashore have shown that 'overtides,' having shorter periods than normal tides, may be thus produced, and these are compared with the overtones of musical sounds, as explained by Helmholtz. The three tides in a day in the Tay at Stirling, Scotland, and in the harbors back of the Isle of Wight are thought to be of this nature. The continuous records of tide gauges reveal an increasing number of stations at which waves of short periods, from 5 to 90 minutes, are found, the shortest of these being much longer than the longest period of wind-made swell (12 to 15 seconds). Some of these oscillations, as in various arms of the Mediterranean, are probably to be compared with the seiches of lakes. W. M. DAVIS.

CURRENT NOTES ON ANTHROPOLOGY.

31ST PEABODY MUSEUM REPORT.

THE thirty-first report of the Peabody Museum of American Archæology and Ethnology describes the progress of its explorations and collections. Those in Central America were continued under the care of Mr. George Gordon. He examined various caves but did not find in them any objects of great antiquity. The collections of casts have been enlarged, but there remains much which the museum could do in this line if it had more funds. Mention is made of the liberality of the Duke of Loubat, of Miss Breton and others. Miss Whitney has given to the Museum the famous 'Calaveras skull,' together with the objects found around it. The general activity indicated by the Report continues to reflect the highest credit on the curator, Professor F. W. Putnam.

THE AIMS OF ETHNOLOGY.

A SUGGESTIVE address was recently delivered before the Batavian Society of Arts and Sciences by Professor Bastian, who is making a prolonged journey in the Orient. His subject was 'The Purposes of Ethnology.' The style is simpler than is usual with this celebrated master, and his matter is highly suggestive. He emphasizes the principle that ethnology concerns itself only with man as a social being, and that he derives all his worth from the others with whom he lives. The elementary thoughts of savage tribes should occupy our first attention. From these we should trace the ethnic modifications which arise in the course of development. They stand in close relation to geographic conditions, which are always the leading factors in ethnic evolution. These thoughts are well brought out in Professor Bastian's address.

THE ARAUCANIAN TONGUE.

THE twenty-first volume of the Library of American Linguistics, published in Paris,